

- 25 -

CLAIMS

1. A procedure for determining the operating parameters of an installation for the thermal cooling of articles (P), comprising a chamber (2) through which said articles (P) pass from an inlet to an outlet, using a cooling fluid (4), the procedure comprising:
- a step (16) of determining a temperature setpoint for articles (P) at the outlet of said chamber (2);
 - a step (18) of determining initial operating parameters for said installation; and
 - a test cycle (29) for testing the operating parameters, which comprises:
 - a step (20) of predicting the temperature of the articles (P) at the outlet of said chamber (2),
 - a step (26) of comparing the setpoint temperature with the predicted temperature and
 - if said comparison step (26) reveals a difference above a predetermined threshold value, a step (28) of modifying the operating parameters of said installation (2), and a repeat of the test cycle,
- said prediction step (20) being carried out on the basis of operating parameters of said chamber (2), of thermodynamic and physical characteristics of said chamber (2) and of thermodynamic and physical characteristics of said articles (P).
2. The procedure as claimed in claim 1, characterized in that said prediction step (20) includes a step (22) of predicting the behavior of said chamber (2) based on the solution of heat balance equations on elementary volume slices of said chamber (2), which is performed at least on the

basis of thermodynamic characteristics of said cooling fluid (4) and thermodynamic and physical characteristics of said chamber (2).

5 3. The procedure as claimed in claim 2, characterized
in that said step (22) of predicting the behavior
of said chamber (2) is furthermore carried out on
the basis of operating parameters of said
installation.

10

4. The procedure as claimed in claim 3, characterized
in that said operating parameters of said
installation represent at least one of the
elements chosen from the group consisting of:

15

- the speed of a conveyor (6) for transporting
said articles (P) through said chamber (2);
- the loading factor; and
- the ventilation of the atmosphere in said
chamber (2).

20

5. Procedure according to any one of claims 1 to 4,
characterized in that said prediction step (20)
includes a step (24) of predicting the behavior of
said articles (P) based on solving the discretized
25 heat conservation equation, applied to a grid of
spatial and temporal points constituting a mesh of
said articles (P), which is carried out at least
on the basis of thermodynamic and physical
characteristics of said articles (P).

30

6. The procedure as claimed in claim 5, characterized
in that said step (24) of predicting the behavior
of said articles (P) is furthermore carried out on
the basis of operating parameters of said
35 installation.

7. The procedure as claimed in claim 6, characterized
in that said operating parameters of said
installation include the temperature of said

articles (P) at the outlet of said chamber (2).

- 5 8. The procedure as claimed in any one of claims 5 to 7, characterized in that said step (24) of predicting the behavior of said articles (P) is optimized by calculations involving the modification of said mesh of said articles (P) using mathematical series.
- 10 9. The procedure as claimed in any one of claims 5 to 8, characterized in that said step (24) of predicting the behavior of said articles (P) is optimized by omitting the prediction calculations for spatial and temporal points of said mesh of
15 said articles (P) for which the enthalpy changes are below a predetermined threshold value:
- 20 10. The procedure as claimed in claims 2 and 5 taken together, characterized in that said step (20) of predicting the temperature of said articles (P) at the outlet of said chamber (2) is based on said step (22) of predicting the behavior of said chamber (2) and on said step (24) of predicting the behavior of said articles (P).
- 25 11. The procedure as claimed in any one of claims 1 to 10, characterized in that said step (28) of modifying the operating parameters includes a step of manually modifying at least some of the
30 operating parameters.
- 35 12. The procedure as claimed in any one of claims 1 to 11, characterized in that said step (28) of modifying the operating parameters comprises automatically modifying at least some of said operating parameters.
13. The procedure as claimed in any one of claims 1 to 12, characterized in that said step (28) of

modifying the operating parameters comprises modifying at least one of the parameters chosen from the group consisting of:

- 5 - the flow rate of said cooling fluid (4);
- the residence time of said articles (P) in said chamber (2);
- the flow rate of gas extracted from said chamber (2);
- the gas speed-up;
- 10 - the gas recirculation; and
- the balance between the amounts of incoming air and the amounts of outgoing gas.